



QUICK REFERENCE GUIDE IP NETWORKING

QUALITY IN
PARTNERSHIP

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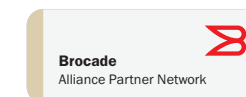
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Campus Network Switching and Routing

NETWORK LAYER	ACCESS		ACCESS/AGGREGATION	AGGREGATION/CORE	CORE
BROCADE® MODEL	ICX 6430 and 6450	FCX Switch	ICX™ 6610	FastIron SX 800/1600 Switch	MLX
OVERVIEW					
PART NUMBERS	ICX 6430-24, ICX 6430-24P, ICX 6430-48, ICX 6430-48P, ICX 6450-24, ICX 6450-24P, ICX 6450-48, ICX 6450-48P	FCX624S, FCX624S-F, FCX624S-HPOE, FCX648S, FCX648S-HPOE	ICX6610-24-E, ICX6610-24-I, ICX6610-24P-E, ICX6610-24P-I, ICX6610-24F-E, ICX6610-24F-I, ICX6610-48-E, ICX6610-48-I, ICX6610-48P-E, ICX6610-48P-I • I = power supply side intake airflow • E = power supply side exhaust airflow	FI-SX800-AC/-DC, FI-SX1600-AC/-DC	NI-MLX-4-AC/-DC, NI-MLX-8-AC/-DC, NI-MLX-16-AC/-DC, NI-MLX-32-AC/-DC
INTERFACE SLOTS	N/A	1 (uplink)	N/A	8, 16	4, 8, 16, 32
MAXIMUM PORTS	ICX 6430: • Up to 48 x 10/100/1000 MbE (RJ45) • 4 x 1 GbE (SFP) dual-mode stacking/uplink • Stackable up to 192 x 10/100/1000 MbE (RJ45) and 16x1 GbE ICX 6450: • Up to 48 x 10/100/1000 MbE (RJ45) • Up to 4 x 10 GbE (SFP+) dual-mode stacking/uplink • Stackable up to 384 x 10/100/1000 MbE (RJ45) and 32x10 GbE	• Up to 48 x 10/100/1000 MbE (RJ45) • Up to 24 x 100/1000 SFP Ports on the second line • 4 x combination (SFP) • Up to 2 x 10 GbE (XFP) • 2 x 16 Gbps dedicated stacking ports • Stackable up to 384 x 10/100/1000 MbE (RJ45) PoE/Non-PoE	• Up to 48 x 10/100/1000 MbE (RJ45) • Up to 24 x 100/1000 SFP • 8 x dual mode 1/10 GbE (SFP+) • 4 x 40 Gbps QSFP stacking ports • Stackable up to 384 x 10/100/1000 MbE (RJ45) and 64x10 GbE	• Up to 400 x 10/100/100 MbE (RJ45) • Up to 400 x 100/100 MbE (SFP) • Up to 384 x 10/100/1000 MbE (RJ45) PoE • Up to 36 x 10 GbE (XFP)	• Up to 1,536 x 10/100/1000 MbE (RJ45/RJ21) • Up to 768 x 100/1000 MbE (SFP) • Up to 16 x 100 GbE (CFP) • Up to 256 x 10 GbE (XFP/SFP+) • Up to 256 x OC12/48 POS/SDH • Up to 64 x OC192 POS/SDH
POWER OVER ETHERNET (POE)	• 802.3af PoE up to class-3 (15.4W) • 802.3at PoE+ up to class-4 (30W)	• 802.3af PoE up to class-3 (15.4W) • 802.3at PoE+ up to class-4 (30W)	• 802.3af PoE up to class-3 (15.4W) • 802.3at PoE+ up to class-4 (30W)	• 802.3af PoE up to class-3 (15.4W)	No
HARDWARE FEATURES	ICX 6430: • Up to 104 Gbps switching capacity • Up to 77 MPPS forwarding capacity • Fixed AC power supply • EEE (Energy Efficient Ethernet) ready ICX 6450: • Up to 176 Gbps switching capacity • Up to 132 MPPS forwarding capacity • Fixed AC power supply • EEE (Energy Efficient Ethernet) ready • MACsec ready	• Up to 136 Gbps switching capacity • Up to 101 MPPS forwarding capacity • 1+1 redundant AC power supplies • Hot swappable power supplies	• Up to 528 Gbps switching capacity • Up to 396 MPPS forwarding capacity (wire speed) • 1+1 redundant AC power supplies • Hot swappable power supplies • 1+1 redundant fan trays • Hot swappable fan trays • EEE (Energy Efficient Ethernet) ready • MACsec ready • 40 GbE ready	• Up to 1080 Gbps switching capacity • Up to 636 MPPS forwarding capacity • Redundant management modules • Redundant fabric modules • N+1 redundant AC/DC power supplies • Hot swappable fan trays • Hot swappable power supplies • Hot swappable fan units	• Up to 7.68 Tbps switching capacity • Up to 4 BPPS forwarding capacity • Front-to-Back airflow • Redundant management modules • Redundant fabric modules • M+N redundant power supplies • Hot swappable modules • Hot swappable power supplies • Hot swappable fan units
MODULES AVAILABLE (INDIVIDUAL)	N/A	N/A	N/A	N/A	N/A
MODULES AVAILABLE (SHARED)	N/A	• 2-port 10 GbE uplink module	N/A	• 0-port management module • 2-port 10 GbE management module • Switch fabric module • 24-port 10/100/1000 MbE RJ45 module • 24-port 10/100/1000 MbE RJ45 PoE module • 24-port 10/100/1000 MbE RJ45 PoE+ module (MACsec, EEE ready) • 48-port 10/100/1000 MbE RJ45 PoE+ module • 24-port 100/1000 SFP module (MACsec ready) • 2-port 10 GbE XFP module • 2-port 10 GbE SFP+ module (MACsec ready) • 8-port 10 GbE SFP+ module (MACsec ready)	• Management module • Switch fabric module and High-speed switch fabric module • 1-port 100 GbE module • 8-port 10-GbE SFP+ module (-D, -M, -X versions) • 4-port 10-GbE XFP module • 2-port 10-GbE XFP module • 48-port 10/100/1000Base-T, MRJ21 module • 24-port 1-GbE (ML) Copper (RJ45) Module • 24-port 1-GbE (ML) Fiber (SFP) Module • 8-port OC-12/48 POS/SDH module • 4-port OC-12/48 POS/SDH module • 2-port OC-12/48 POS/SDH module • 2-port OC192 POS/SDH module
HEIGHT	1 RU	1 RU	1 RU	6 RU, 14 RU	4, 7, 14, 33 RU
MANAGEMENT MODULES (+REDUNDANCY)	N/A	N/A	N/A	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)
SWITCH FABRIC MODULES (+REDUNDANCY)	N/A	N/A	N/A	2 (Base)	2/2/3/7 (Base) + 1/1/1/1 (Optional)
AC POWER SUPPLIES (+REDUNDANCY)	1 (Base) + Optional EPS/RPS for system power redundancy and extra POE capacity	1 (Base) + 1 (Optional) Full 48-ports PoE+ requires both power supplies	1 (Base) + 1 (Optional) Full 48-ports PoE+ requires both power supplies	System: 1/3 (Base) + 1 (Optional) POE: 1/3 (Base) + 1 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)
HOT SWAPPABLE COMPONENTS	SFP/SFP+ transceivers	SFP/XFP transceivers, power supplies	SFP/XFP transceivers, power supplies, fan trays	SFP/XFP transceivers, power supplies, fan assemblies, Switch Fabric modules, Management modules, Interface modules	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, interface modules
HARDWARE OPTIONS (INDIVIDUAL)				Mid-mount Rack Kit 8-slot	
HARDWARE OPTIONS (SHARED)	ICX 6430: • 36W or 65W AC power supply • 525W AC power supply (PoE) • 1 and 5 Meter SFP stacking cable options ICX 6450: • 65W or 100W AC power supply • 525W or 880W AC power supply (PoE) • 1, 3 and 5 Meter SFP stacking cable	• 210W AC power supply • 610W AC power supply (PoE) • Rack Mount Kit	• 250W AC power supply • 1000W AC power supply (PoE) • Fan tray • 4 Post Rack Mount kit • 1 Meter QSFP stacking cable • 5 Meter QSFP stacking cable	• PoE DIMM for 24-port 10/100/100 MbE (RJ45) interface modules • 1200W SYS power supply • 1250W POE power supply • 2500W POE power supply	• 1200W AC/DC power supply • 2400W AC/DC power supply
STANDARD SOFTWARE	ICX 6430: • Advanced Layer 2 support ICX 6450: • Advanced Layer 2 support (include IPv4 static routes)	• Advanced Layer 2 and full Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies. • IP4/IP6 routing: RiPng (IPv6), OSPFv2/v3, VRRP, VRRPE, VRRPv3, DVMRP, PIM	• Advanced Layer 2 and base Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies. • IP4/IP6 routing; static routes	• Advanced Layer 2 and Base Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies	• Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RiPng, VRRP, VRRPE, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF
OPTIONAL SOFTWARE UPGRADES	ICX 6450: • Premium L3: IPv4 routing - RiPv1/v2 OSPFv2/v3, VRRP, VRRPE • 2x10 GbE upgrade license: converts 1 GbE uplinks to 10 GbE	• Advanced L3: BGP, GRE, IPv6 over IPv4 tunnels	• Premium L3: IP4/IP6 routing - RiPv1/v2 RiPng (IPv6), OSPFv2/v3, VRRP, VRRPE, VRRPv3, DVMRP, PIM • Advanced L3: BGP	• Full Layer 3 IPv4 Upgrade including BGP-4, OSPFv2, RiPv1/v2, VRRP, VRRPE, DVMRP, PIM-SM and PIM-DM • Full Layer 3 IPv4+IPv6 upgrade including RiPng, OSPFv3, IPv6 static routes, 6-to-4 static tunneling. This upgrade also includes Full L3 IPv4 services	• Collaborative intelligence with secure sensors for monitoring all 802.11 (a/b/g/n) wireless traffic in real time for the highest level of security, rogue mitigation and policy enforcement
OTHER BASE FEATURES		N/A		N/A	N/A
TARGET ENVIRONMENT	• Campus LAN • Converged edge (voice + data) • VoIP and Unified Communications (UC) • Wireless Access • Small to medium enterprise • Branch offices • K-12 education	• VoIP • Campus LAN • Wireless Access • Converged edge (voice + video + data) • Video surveillance • Remote video kiosks • Building management systems	• Campus LAN • Converged edge (voice + video + data) • VoIP and Unified Communications (UC) • Video streaming: HD video, IPTV, distance learning • VDI: Low jitter/low latency • Wireless Access • Video surveillance • Remote video kiosks • Building management systems • Financial enterprises and trading floors	• Campus LAN • Converged edge (voice + video + data) VoIP and Unified Communications (UC) • Video streaming: HD video, IPTV, distance learning • VDI: Low jitter/low latency • Wireless Access • Video surveillance • Remote video kiosks • Building management systems • Financial enterprises and trading floors	• Campus LAN • Voice, video and data • Campus border routing • Enterprise MPLS/VPLS and virtual routing • MPLS enabled campus core • Financial enterprises and trading floors











Wireless

NETWORK LAYER	Wireless	
BROCADE MODEL	AirDefense WLAN Security Appliances	
SERIES OVERVIEW		
PRODUCT OVERVIEW	SV-1250-P-1, SV-3650-P-1, SV-4250-P-1	
INTERFACE SLOTS	N/A	
MAXIMUM PORTS	• 1-2 RJ45 NIC connectors for 10/100/1000 Mb connections • Stacked PS/2 ports for keyboard and mouse • Video Connector	
POWER OVER ETHERNET (POE)	No	
HARDWARE FEATURES	• Active/Backup Clustering • Intel Pentium 4 3.4 GHz, Intel 2.13GHz Core2 Duo, or Intel 2.33GHz Xeon 5140 • 1-8 MB RAM • 250 GB-1 TB Disk Storage	
MODULES AVAILABLE (INDIVIDUAL)	N/A	
MODULES AVAILABLE (SHARED)	N/A	
HEIGHT	1, 2 RU	
MANAGEMENT MODULES (+REDUNDANCY)	N/A	
SWITCH FABRIC MODULES (+REDUNDANCY)	N/A	
AC POWER SUPPLIES (+REDUNDANCY)	1 (Base) + 1 (Optional)	
HOT SWAPPABLE COMPONENTS	Power supply	
HARDWARE OPTIONS (INDIVIDUAL)		
HARDWARE OPTIONS (SHARED)	500W Power supply	
STANDARD SOFTWARE	• Collaborative intelligence with secure sensors for monitoring all 802.11 (a/b/g/n) wireless traffic in real time for the highest level of security, rogue mitigation and policy enforcement	
OPTIONAL SOFTWARE UPGRADES	• For policy compliance, robust performance monitoring and troubleshooting, RF analysis, advanced forensics, and wireless vulnerability assessment	
OTHER BASE FEATURES	N/A	
TARGET ENVIRONMENT	• Branch to Campus to Enterprise-level WLAN deployments	




Wireless

NETWORK LAYER	Wireless	
BROCADE MODEL	Brocade Mobility 7131	BROCADE MOBILITY 650
SERIES OVERVIEW		
PRODUCT OVERVIEW	The Brocade Mobility 7131 is the industry's first high performance 802.11a/b/g/n access point that cost-effectively delivers secure and resilient network services and enables high performance mobility applications in a wireless enterprise. The Brocade Mobility 7131 AP in a standalone mode or adopted by a controller provides 24x7 dedicated wireless IDS/IPS sensing, high speed client access for data (VDI), voice and video traffic and mesh networking. This integrated network-in-a-box delivers gap-free security, unmatched reliability and high performance at the industry's lowest total cost of ownership.	The Brocade Mobility 650 is a thin (dependent) multipurpose AP designed to lower the cost of deploying and operating a secure, reliable 802.11a/b/g/n wireless LAN. This highly efficient AP offers simultaneous high speed WLAN access for data (VDI), voice and video traffic and comprehensive, wireless intrusion-prevention sensing, and remote over-the-air help-desk support. This integrated network-in-a-box delivers gap-free security, unmatched reliability and high performance at the industry's lowest total cost of ownership.
GENERAL CHARACTERISTICS	• 802.11a/b/g/n; DSSS and ODFM • Tri, dual, and single radio options • 802.3af (PoE) and 802.3at (PoE+) support • Mesh networking • Standalone or controller-adopted modes • 3G cellular backhaul extensibility options • Metal, plenum-rated housing (UL2043) • Up to 127 clients supported • Above drop ceiling, under ceiling (T-Bar), or on wall (no additional hardware required)	• 802.11a/b/g/n; DSSS and ODFM • Dual, and single radio options • 802.3af (PoE) and 802.3at (PoE+) support • Thin (dependent) Access Point (AP) • Metal, plenum-rated housing (UL2043) • Up to 127 clients supported • Ceiling mount (above tile); wall mount
NON-BLOCKING 802.11N PERFORMANCE		
DIRECT FORWARDING	Standalone or controller-adopted APs forward traffic directly to the next AP via the best-quality path with full QoS and security, minimizing wired traffic, eliminating controller bottleneck or single point of failure, and accelerating applications.	
UNMATCHED RELIABILITY		
QOS	Voice prioritization; WMM-power save with TSPEC Admission Control; WMM U-APSD; Layer 1-4 packet classification; 802.1p VLAN priority; DiffServ/TOS; 802.11e; 802.11k; SVP, SIP CAC (call admission control)	
FAILOVER ADAPTIVE NETWORK SERVICES AT EDGE	Standalone or controller-adopted APs forward traffic directly to the next AP even when connection to the controller is interrupted	NA
SMART RF	Network optimization to ensure user quality of experience at all times by dynamic adjustments to channel and power (on detection of RF interference or loss of RF coverage/neighbor recovery). Available for both thin APs and Adaptive APs.	
MESH NETWORKING	Stand-alone mesh; Adaptive mesh; self-healing mesh failover; Layer 2 wired to Mesh failover	NA
3G/4G WAN BACKHAUL	Optional ExpressCard WWAN slot (card not included) WWAN feature license required	NA
GAP-FREE SECURITY		
AUTHENTICATION	Access Control Lists (ACLs); pre-shared keys (PSK); 802.1x/EAP—transport layer security (TLS), tunneled transport layer security (TTLS), protected EAP (PEAP); Kerberos Integrated AAA/RADIUS Server with native support for EAP-TLS, EAP-PEAP (includes a built-in user name/password database; supports LDAP), and EAP-SIM; local authentication database	Access Control Lists (ACLs); pre-shared keys (PSK); 802.1x/EAP—transport layer security (TLS), tunneled transport layer security (TTLS), protected EAP (PEAP); Kerberos Integrated AAA/RADIUS Server with native support for EAP-TLS, EAP-PEAP, and EAP-SIM
ENCRYPTION	WEP 40/128 (RC4); WPA-TKIP; WPA2-CCMP (AES); 802.11i WPA2-TKIP; Multi Cipher support	
IDS/IPS	Multimode rogue AP detection, rogue AP containment, 802.11n rogue detection, ad hoc network detection, Denial of Service (DoS) protection against wireless attacks, client blacklisting, excessive authentication/association; excessive probes; excessive disassociation/de-authentication; excessive decryption errors; excessive authentication failures; excessive 802.11 replay; excessive crypto IV failures (TKIP/CCMP replay); suspicious AP, authorized device in ad hoc mode, unauthorized AP using authorized SSID, EAP Flood, Fake AP Flood, ID theft, ad hoc advertising authorized SSID	
GUEST ACCESS	Provides secure guest access for wired and wireless clients. Built-in captive portal, customizable login and welcome pages, URL redirection for user login, usage-based charging, dynamic VLAN assignment of clients, DNS white list, GRE tunneling of traffic to central site, API support for interoperability with custom web portals (e.g. Wandering Wi-Fi), Amigopod, support for external authentication and billing systems	
24X7 MONITORING FOR PREMIUM SECURITY	Brocade dual-purpose APs provide wireless traffic and dedicated dual-band sensing. This eliminates the need to purchase and manage a dedicated sensing infrastructure while providing a greener and more cost-effective approach to 24/7 security.	
IPSEC VPN	Supports DES, 3DES, AES-128, and AES-256 encryption, with site-to-site and client-to-site VPN capabilities.	
ROLE-BASED WIRED/WIRELESS FIREWALL	Role-based wired/wireless firewall (Layer 2-7) with stateful inspection for wired and wireless traffic; protects against IP spoofing and ARP cache poisoning.	
FAST ROAMING	Pre-emptive roaming; fast roaming with opportunistic channel scan; load balancing; Power Save Polling (PSP), Virtual AP and location-based access control	
BEST RETURN ON INVESTMENT (ROI) - AND LOWEST TOTAL COST OF OWNERSHIP (TCO)		
INTEGRATED NETWORK SERVICES	Routing, security, and network services integration eliminates point products and appliances, saving significant CapEx and OpEx	
EASE OF INSTALLATION	Controller provides centralized management for all Brocade Mobility APs deployed locally or remotely. Plug-and-play deployments over Layer 2 and Layer 3 networks	
802.3AF/AT SUPPORT	Eliminates the cost of running power to each AP	
MESH NETWORKING	Eliminates the cost of running Ethernet cabling to each AP	
NETWORK LAYER		
BROCADE MODEL	Brocade 1860-1	Brocade 1860-2
SERIES OVERVIEW		
PART NUMBERS	BR-1860-1F00 (16G optics), BR-1860-1P00 (10G optics), BR-1860-1C00 (no media)	BR-1860-2F00 (16G optics), BR-1860-2P00 (10G optics), BR-1860-2C00 (no media)
PROTOCOL	FC, DCB, FCoE, iSCSI	FC, DCB, FCoE, iSCSI
PORTS	1	2
PORT SPEED	16/8/4/2 Gbps FC, 10 GbE	16/8/4/2 Gbps FC, 10 GbE
BUS TYPE	PCIe 2.0 x8	PCIe 2.0 x8








Data Center Network Switching and Routing

NETWORK LAYER	ACCESS			AGGREGATION				ACCESS/AGGREGATION	CORE	
BROCADE MODEL	FCX Switch	NetIron CES Switch	TurboIron 24X Switch	8000 Switch	VDX® 6710 Switch	VDX 6720 Switch	VDX 6730 Switch	BigIron RX	MLXe	MLX
SERIES OVERVIEW										
PART NUMBERS	FCX624, FCX648	NI-CES-2024C-AC/-DC, NI-CES-2024F-AC/-DC, NI-CES-2048C-AC/-DC, NI-CES-2048F-AC/-DC, NI-CES-2048CX-AC/-DC, NI-CES-2048FX-AC/-DC	TI-24X-AC	BR-8000-0000	BR-VDX 6710-54	BR-VDX 6720-16, BR-VDX 6720-24, BR-VDX 6720-40, BR-VDX 6720-60	BR-VDX 6730-16, BR-VDX 6730-24, BR-VDX 6730-40, BR-VDX 6730-60	BI-RX-4-AC/-DC, BI-RX-8-AC/-DC, BI-RX-16-AC/-DC	NI-MLXe-4-AC/-DC, NI-MLXe-8-AC/-DC, NI-MLXe-16-AC/-DC, NI-MLXe-32-AC/-DC	NI-MLX-4-AC/-DC, NI-MLX-8-AC/-DC, NI-MLX-16-AC/-DC, NI-MLX-32-AC/-DC
INTERFACE SLOTS	1 (uplink)	1 (uplink)	N/A	N/A	N/A	N/A	N/A	4, 8, 16	4, 8, 16, 32	4, 8, 16, 32
MAXIMUM PORTS	<ul style="list-style-type: none"> Up to 48 x 10/100/1000 MbE (RJ45) Up to 4 x 10 GbE (SFP+) 	<ul style="list-style-type: none"> Up to 48 x 10/100/1000 MbE (RJ45) Up to 48 x 100/1000 MbE (SFP) 4 x combination (SFP or RJ45) Up to 2 x 10 GbE (XFP) 	<ul style="list-style-type: none"> 24 x 10 GbE/1 GbE (SFP+/SFP) 4 x 10/100/1000 MbE (RJ45) 	<ul style="list-style-type: none"> 24 10 GbE ports (DCB) 8 8 Gbps FC ports added with service FCoE upgrade license 	<ul style="list-style-type: none"> 48 1 GbE RJ45 and 6 10 GbE/1 GbE SFP+ ports 	<ul style="list-style-type: none"> Up to 24 10 GbE/1 GbE SFP+ ports on 6730-24 Up to 60 10 GbE/1 GbE SFP+ ports on 6730-60 	<ul style="list-style-type: none"> Up to 24 10 GbE/1 GbE SFP+ ports and 8 FC ports on 6730-24 Up to 60 10 GbE/1 GbE SFP+ ports and 16 FC ports on 6730-60 	<ul style="list-style-type: none"> Up to 768 x 10/100/1000 MbE (RJ45/RJ21) Up to 384 x 100/1000 MbE (SFP) Up to 256 x 10 GbE (XFP/SFP+) 	<ul style="list-style-type: none"> Up to 1,536 x 10/100/1000 MbE (RJ45/RJ21) Up to 768 x 100/1000 MbE (SFP) Up to 256 x 10 GbE (XFP/SFP+) Up to 32 x 100 GbE (CFP) Up to 256 x OC12/48 POS/SDH Up to 64 x OC192 POS/SDH 	<ul style="list-style-type: none"> Up to 1,536 x 10/100/1000 MbE (RJ45/RJ21) Up to 768 x 100/1000 MbE (SFP) Up to 16 x 100 GbE (CFP) Up to 256 x 10 GbE (XFP/SFP+) Up to 256 x OC12/48 POS/SDH Up to 64 x OC192 POS/SDH
HARDWARE FEATURES	<ul style="list-style-type: none"> Up to 176 Gbps switching capacity Up to 132 Mpps forwarding capacity 1+1 redundant AC power supplies Hot swappable power supplies 	<ul style="list-style-type: none"> Up to 136 Gbps switching capacity Up to 101 Mpps forwarding capacity Low latency Deep packet buffering 1+1 redundant AC/DC power supplies Hot swappable power supplies Hot swappable fan unit Front-to-back airflow 	<ul style="list-style-type: none"> Up to 488 Gbps switching capacity Up to 366 Mpps forwarding capacity Ultra-low latency (1500 nSec) 1+1 redundant AC power supplies Hot swappable power supplies Hot swappable fan unit Front-to-back airflow 	<ul style="list-style-type: none"> Up to 360 Mpps forwarding capacity Hot swappable redundant power supplies Hot swappable redundant fan assemblies Hot swappable SFP+ optical modules 	<ul style="list-style-type: none"> Up to 216 Gbps switching capacity; wire-speed on all ports ISL Trunking in hardware Hot swappable, redundant power and cooling Reversible front-to-rear airflow 	<ul style="list-style-type: none"> Up to 1200 Gbps switching capacity; wire-speed on all ports ISL Trunking in hardware Ports On Demand Direct-attached copper and optical transceiver cabling options Hot swappable, redundant power and cooling Reversible front-to-rear airflow 	<ul style="list-style-type: none"> Up to 1456 Gbps switching capacity; wire-speed on all ports ISL Trunking in hardware Ports On Demand Direct-attached copper and optical transceiver cabling options Hot swappable, redundant power and cooling Reversible front-to-rear airflow 	<ul style="list-style-type: none"> Up to 3.84 Tbps switching capacity Up to 1.142 Mpps forwarding capacity Front-to-Back airflow Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units 	<ul style="list-style-type: none"> Up to 15.36 Tbps switching capacity Up to 4.8 billion PPS forwarding capacity Rear exhaust on all models Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units 	<ul style="list-style-type: none"> Up to 7.68 Tbps switching capacity Up to 4 BPPS forwarding capacity Front-to-Back airflow Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units
MODULES AVAILABLE (INDIVIDUAL)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MODULES AVAILABLE (SHARED)	<ul style="list-style-type: none"> 4-port 10 GbE SFP+ uplink module 4-port 1 GbE SFP uplink module 	<ul style="list-style-type: none"> 2-port 10 GbE uplink module 	N/A	N/A	N/A	N/A	N/A	<ul style="list-style-type: none"> Management module Switch fabric module 24-port 10/100/1000 MbE RJ45 module 48-port 10/100/1000 MbE RJ21 module 24-port 100/1000 SFP module 4-port 10 GbE XFP module 16-port 10 GbE SFP+ module 	<ul style="list-style-type: none"> Management module High-speed switch fabric module 2-port 100 GbE module 8-port 10-GbE SFP+ module (-D, -M, -X versions) 4-port 10-GbE XFP module 2-port 10-GbE XFP module 48-port 10/100/1000Base-T, MRJ21 module 24-port 1-GbE (X) Copper (RJ-45) Module 24-port 1-GbE (X) Fiber (SFP) Module 8-port OC-12/48 POS/SDH module 4-port OC-12/48 POS/SDH module 2-port OC-12/48 POS/SDH module 2-port OC192 POS/SDH module 	<ul style="list-style-type: none"> Management module Switch fabric module and High-speed switch fabric module 1-port 100 GbE module 8-port 10-GbE SFP+ module (-D, -M, -X versions) 4-port 10-GbE XFP module 2-port 10-GbE XFP module 48-port 10/100/1000Base-T, MRJ21 module 24-port 1-GbE (ML) Copper (RJ-45) Module 24-port 1-GbE (ML) Fiber (SFP) Module 8-port OC-12/48 POS/SDH module 4-port OC-12/48 POS/SDH module 2-port OC-12/48 POS/SDH module 2-port OC192 POS/SDH module
HEIGHT	1 RU	1 RU	1 RU	1 RU	1 RU	2 RU	BR-VDX 6730-16: 1RU, BR-VDX 6730-24: 1RU, BR-VDX 6730-40: 2RU, BR-VDX 6730-60: 2RU	4, 7, 14 RU	5, 7, 14, 33 RU	4, 7, 14, 33 RU
MANAGEMENT MODULES (+REDUNDANCY)	N/A	N/A	N/A	N/A	One 10/100/1000 BaseT port for management connection with RJ45 connector One RS-232 for terminal access via RJ45 connector One USB port for system log file downloads or firmware upgrades	One 10/100/1000 BaseT port for management connection with RJ45 connector One 10/100 BaseT port for RLO management connection with RJ45 connector One RS-232 for terminal access via RJ45 connector One USB port for system log file downloads or firmware upgrades	One 10/100/1000 BaseT port for management connection with RJ45 connector One 10/100 BaseT port for RLO management connection with RJ45 connector One RS-232 for terminal access via RJ45 connector One USB port for system log file downloads or firmware upgrades	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)
SWITCH FABRIC MODULES (+REDUNDANCY)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2/2/3 (Base) + 1/1/1 (Optional)	2/2/3/7 (Base) + 1/1/1/1 (Optional)	2/2/3/7 (Base) + 1/1/1/1 (Optional)
AC POWER SUPPLIES (+REDUNDANCY)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)	2 hot swappable and redundant power supplies	2 hot swappable and redundant power supplies	2 hot swappable and redundant power supplies	2 hot swappable and redundant power supplies	1/2/4 (Base) + 2/2/4 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)
HOT SWAPPABLE COMPONENTS	SFP/SFP+ transceivers, power supplies	SFP/XFP transceivers, power supplies, fan assembly	SFP/SFP+ transceivers, power supplies, fan assembly	AC power systems, fans and SFP+ optics	Integrated power and fans. SFP+ optics	Power, fans and SFP+ optics	BR-VDX 6730-32: Integrated power and fans. SFP+ optics BR-VDX 6730-76: Power, fans and SFP+ optics	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, interface modules	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, and interface modules	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, interface modules
HARDWARE OPTIONS (INDIVIDUAL)		<ul style="list-style-type: none"> Mid-mount rack kit 8-slot 		<ul style="list-style-type: none"> Rack mounting kit 	<ul style="list-style-type: none"> Rack mounting kit 	<ul style="list-style-type: none"> Rack mounting kit 	<ul style="list-style-type: none"> Rack mounting kit 		N/A	
HARDWARE OPTIONS (SHARED)	<ul style="list-style-type: none"> 210W AC power supply Rack mount kit (Extra long ears) 	<ul style="list-style-type: none"> 500W AC/DC power supply Rack mount kit (Extra long ears) 	<ul style="list-style-type: none"> 300W AC power supply Rack mount kit (Extra long ears) 	<ul style="list-style-type: none"> FC and FCoE upgrade license 				<ul style="list-style-type: none"> 1200W AC/DC Power supply 2400W AC/DC Power supply 	<ul style="list-style-type: none"> 1200W AC/DC power supply 2400W AC/DC power supply 	<ul style="list-style-type: none"> 1200W AC/DC Power supply 2400W AC/DC Power supply
STANDARD SOFTWARE	<ul style="list-style-type: none"> Advanced Layer 2 and enterprise Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies 	<ul style="list-style-type: none"> Advanced Layer 2 and Base Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies 	<ul style="list-style-type: none"> Advanced Layer 2 and Layer 3 including QoS, 802.1x, and comprehensive hardware based port and VLAN based ACL policies 	<ul style="list-style-type: none"> Fabric OS® (FOS), Full Layer 2 features set supporting relevant protocols and robust QoS, Security and management 	<ul style="list-style-type: none"> Virtual Cluster Switching (VCS®) technology to build Ethernet Fabrics Automatic Migration of Port Profiles Full Layer 2 feature set VM aware network automation 	<ul style="list-style-type: none"> VCS technology to build Ethernet Fabrics Automatic Migration of Port Profiles Full Layer 2 feature set VM aware network automation 	<ul style="list-style-type: none"> VCS technology to build Ethernet Fabrics Automatic Migration of Port Profiles Full Layer 2 feature set VM aware network automation 	<ul style="list-style-type: none"> Full Layer 3 IPv4+IPv6 including RIPv1/v2, RIPng, OSPFv2/v3, ISIS, BGP-4, DVMRP, PIM-SM/DM 	<ul style="list-style-type: none"> Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RIPng, VRRP, VRRPE, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF 	<ul style="list-style-type: none"> Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RIPng, VRRP, VRRPE, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF
OPTIONAL SOFTWARE UPGRADES	<ul style="list-style-type: none"> Advance Layer 3 licence that includes BGP 	<ul style="list-style-type: none"> Full Layer 3 IPv4 upgrade including BGP-4, RIPv1/v2, OSPFv2, DVMRP, PIM Full Metro upgrade including MPLS, VPLS, VLL, PBB 	N/A	<ul style="list-style-type: none"> FC and FCoE upgrade license 	<ul style="list-style-type: none"> VCS license 	<ul style="list-style-type: none"> Ports On Demand licenses VCS license FCoE license 	<ul style="list-style-type: none"> Ports On Demand licenses VCS license FCoE license 		N/A	
OTHER BASE FEATURES	<ul style="list-style-type: none"> Reversible front-to-back airflow Horizontal stacking (IronStack technology) 	N/A	<ul style="list-style-type: none"> Front-to-Back airflow 	<ul style="list-style-type: none"> Link aggregation Frame-based trunking 	N/A	N/A	N/A	N/A	N/A	N/A
TARGET ENVIRONMENT	<ul style="list-style-type: none"> Data center Top-of-Rack 1 GbE server access iSCSI storage applications High-Performance Computing 	<ul style="list-style-type: none"> Data center Top-of-Rack 1 GbE server access Layer 3 virtualization Hosting solutions Content delivery networks 	<ul style="list-style-type: none"> Data center Top-of-Rack 10 GbE server access Top-of-Rack 1 GbE server access Data center aggregation High-Performance Cluster Computing 	<ul style="list-style-type: none"> Top-of-Rack Ethernet and DCB environments Access layer top-of-rack server connectivity Access layer server I/O consolidation (with upgrade license) 	<ul style="list-style-type: none"> Cost effective 1 GbE fixed port switch with VCS fabric connectivity 	<ul style="list-style-type: none"> 10 GbE fixed port switch with VCS fabric connectivity Scale-out Ethernet fabrics to flatten the network in virtualized data centers Converge storage traffic (FCoE, iSCSI) in the Ethernet fabric; multi-hop FCoE 	<ul style="list-style-type: none"> 10 GbE fixed port switch with VCS fabric connectivity Scale-out Ethernet fabrics to flatten the network in virtualized data centers Converge storage traffic (FCoE, iSCSI) in the Ethernet fabric; multi-hop FCoE Native FC ports bridging VCS fabric to FC SAN 	<ul style="list-style-type: none"> Data center 10 GbE server access 1 GbE server access 10 GbE data center aggregation High-Performance Cluster Computing Enterprise data centers 	<ul style="list-style-type: none"> Transit Internet Exchange Provider (IXP) Cable MSO Content Delivery Network (CDN) Federal High-performance computing Research networks 	<ul style="list-style-type: none"> Data center Mid/End-of-row 10 GbE aggregation Layer 3 virtualization High-performance 10 GbE core Data center border routing High-Performance Cluster Computing 1 GbE vertical top-of-rack

Campus Network Switching and Routing

NETWORK LAYER	WLAN Controllers		
BROCADE MODEL	BROCADE MOBILITY RFS4000	Brocade Mobility RFS6000	Brocade Mobility RFS7000
SERIES OVERVIEW			
PRODUCT OVERVIEW	Brocade Mobility RFS4000 Controller tightly integrates wired, wireless, and network security features into a compact and easy-to-use form factor that features an ExpressCard Slot for 3G WAN backhaul, enabling organizations to create survivable remote office networks using a single platform. The comprehensive software delivers advanced Layer 2 and Layer 3 networking services, onboard DHCP server, wired/wireless firewall, wireless IDS/IPS, AAA services, IP Security (IPsec) VPN gateway, Wi-Fi RFID locationing, QoS mechanisms for VDI, VoWLAN, and video services, and an ExpressCard Slot for 3G WAN backhaul. No expensive add-on licenses are needed resulting in the best return on investment.	Brocade Mobility RFS6000 Controller provides a single platform capable of managing wireless data, voice, and video services for medium to large enterprises with 2,000 to 4,000 client devices. Brocade Mobility RFS6000 Controllers deliver advanced capabilities such as Layer 2 and Layer 3 networking services, onboard DHCP server, wired/wireless firewall, wireless IDS/IPS, AAA services, IP Security (IPsec) VPN gateway, Wi-Fi RFID locationing, QoS mechanisms for VDI, VoWLAN, and video services, and an ExpressCard Slot for 3G WAN backhaul. No expensive add-on licenses are needed resulting in the best return on investment.	Brocade® Mobility RFS7000 Controller provides a single platform capable of managing wireless data, voice, and video services for large enterprises with 8,000 to 16,000 client devices. Brocade Mobility RFS7000 Controllers deliver advanced capabilities such as Layer 2 and Layer 3 networking services, onboard DHCP server, wired/wireless firewall, wireless IDS/IPS, AAA services, IP Security (IPsec) VPN gateway, Wi-Fi RFID locationing, QoS mechanisms for VDI, VoWLAN, and video services without expensive add-on licenses for the best return on investment.
GENERAL CHARACTERISTICS	<ul style="list-style-type: none"> Supports up to 6 Brocade Mobility 7131 802.11a/b/g/n access points and 12 per cluster Supports 24 WLANs/VLANs per AP Supports up to 500 clients per AP and 1,000 users per cluster ExpressCard slot for 3G/4G WWAN backhaul PCI/HIPAA/SOX capable out-of-the-box 	<ul style="list-style-type: none"> Supports up to 256 Brocade Mobility 7131 802.11a/b/g/n access points and 512 per cluster Supports 32 WLANs/VLANs per AP Supports up to 2,000 client per AP and 4,000 users per cluster ExpressCard slot for 3G/4G WWAN backhaul PCI/HIPAA/SOX capable out-of-the-box 	<ul style="list-style-type: none"> Supports up to 1024 Brocade Mobility 7131 802.11a/b/g/n access points and 2048 per cluster Supports 256 WLANs/VLANs per AP Supports up to 8,000 client per AP and 16,000 users per cluster PCI/HIPAA/SOX capable out-of-the-box
NON-BLOCKING 802.11N PERFORMANCE			
DIRECT FORWARDING	Standalone or controller-adopted APs forward traffic directly to the next AP via the best-quality path with full QoS and security, minimizing wired traffic, eliminating controller bottleneck or single point of failure, and accelerating applications.		
UNMATCHED RELIABILITY			
QOS	Voice prioritization; WMM-power save with TSPEC Admission Control; WMM U-APSD; Layer 1-4 packet classification; 802.1p VLAN priority; DiffServ/TOS; 802.11e; 802.11k; SVP, SIP CAC (call admission control)		
HIGH AVAILABILITY WITH CLUSTERING	Active:Standby; Active:Active and N+1 redundancy with access point and client load balancing for large deployments; critical resource monitoring		
SMART RF	Network optimization to ensure user quality of experience at all times by dynamic adjustments to channel and power (on detection of RF interference or loss of RF coverage/neighbor recovery). Available for both thin APs and Adaptive APs		
MESH NETWORKING	Stand-alone mesh; Adaptive mesh; self-healing mesh failover; Layer 2 wired to Mesh failover		
LOAD BALANCING AND AP STEERING	AP licenses are shared between clustered controllers		
3G/4G WAN BACKHAUL	Optional ExpressCard WWAN slot (card not included); WWAN feature license included	Optional ExpressCard WWAN slot (card not included) WWAN feature license required	N/A
GAP-FREE SECURITY			
AUTHENTICATION	Access Control Lists (ACLs); pre-shared keys (PSK); 802.1x/EAP—transport layer security (TLS), tunneled transport layer security (TTLS), protected EAP (PEAP); Kerberos Integrated AAA/RADIUS Server with native support for EAP-TTLS, EAP-PEAP (includes a built in user name/password database; supports LDAP), and EAP-SIM; local authentication database		
ENCRYPTION	WEP 40/128 (RC4); WPA-TKIP; WPA2-CCMP (AES); 802.11i WPA2-TKIP; Multi Cipher support		
IDS/IPS	Multimode rogue AP detection, rogue AP containment, 802.11n rogue detection, ad hoc network detection, Denial of Service (DoS) protection against wireless attacks, client blacklisting, excessive authentication/association; excessive probes; excessive disassociation/de-authentication; excessive decryption errors; excessive authentication failures; excessive 802.11 replay; excessive crypto IV failures (TKIP/CCMP replay); suspicious AP, authorized device in ad hoc mode, unauthorized AP using authorized SSID, EAP Flood, Fake AP Flood, ID theft, ad hoc advertising authorized SSID		
GUEST ACCESS	Provides secure guest access for wired and wireless clients. built-in captive portal, customizable login/ welcome pages, URL redirection for user login, usage-based charging, dynamic VLAN assignment of clients, DNS white list, GRE tunneling of traffic to central site, API support for interoperability with custom web portals (e.g. Wandering Wi-Fi), Amigopod, support for external authentication and billing systems		
24x7 MONITORING FOR PREMIUM SECURITY	Brocade dual-purpose APs provide wireless traffic and dedicated dual-band sensing. This eliminates the need to purchase and manage a dedicated sensing infrastructure while providing a greener and more cost-effective approach to 24/7 security.		
IPSEC VPN	Supports DES, 3DES, AES-128, and AES-256 encryption, with site-to-site and client-to-site VPN capabilities	Supports DES, 3DES, AES-128, and AES-256 encryption, with site-to-site and client-to-site VPN capabilities. Supports 300 concurrent IPsec tunnels per controller without ADsec license, and 512 concurrent IPsec tunnels per controller with ADsec license	Supports DES, 3DES, AES-128 and AES-256 encryption, with site-to-site and client-to-site VPN capabilities. Supports 512 concurrent IPsec tunnels per controller without ADsec license, and 1024 concurrent IPsec tunnels per controller with ADsec license.
ROLE-BASED WIRED/WIRELESS FIREWALL	Role-based wired/wireless firewall (Layer 2-7) with stateful inspection for wired and wireless traffic; active firewall sessions—50,000 per controller and 600,000 per cluster; protects against IP spoofing and ARP cache poisoning. Advanced Security License for per user firewall included.	Role-based wired/wireless firewall (Layer 2-7) with stateful inspection for wired and wireless traffic; active firewall sessions—100,000 per controller and 1,200,000 per cluster; protects against IP spoofing and ARP cache poisoning. Per user firewall requires optional Advanced Security License	Role-based wired/wireless firewall (Layer 2-7) with stateful inspection for wired and wireless traffic; active firewall sessions—205,000 per controller and 2,460,000 per cluster; protects against IP spoofing and ARP cache poisoning. Per user firewall requires optional Advanced Security License
NAC SUPPORT	Integration with third-party systems from Microsoft, Symantec, and Bradford		
GEOFENCING	Control or limit network or application access based on a user and their location		
FAST ROAMING	Pre-emptive roaming; fast roaming with opportunistic channel scan; load balancing; Power Save Polling (PSP), Virtual AP and location-based access control		
BEST RETURN ON INVESTMENT (ROI)—AND LOWEST TOTAL COST OF OWNERSHIP (TCO)			
INTEGRATED NETWORK SERVICES	PoE switching, AAA server, DHCP server, NAT, Guest Access Captive portal, RSSI-based triangulation for Wi-Fi assets, Wired/Wireless Firewall- all built-in with no additional cost		
EASE OF INSTALLATION	Provides central management of Brocade Mobility Access Points deployed locally or at remote locations. Plug-and-play deployments over Layer 2 and Layer 3 networks		
SMART LICENSING SHARING	Clustering capability allows for virtual license sharing among controllers to provide highly scalable and available networks		

Service Provider Network Routing

NETWORK LAYER	ACCESS		AGGREGATION		CORE		
BROCADE MODEL	Brocade 6910	NetIron CES 2000 Switch	NetIron CER 2000 Router	MLX	Brocade ADX	MLXe	NetIron XMR
SERIES OVERVIEW							
PART NUMBERS	BR-6910-EAS-AC BR-6910-EAS-DC BR-6910-EAS-H-DC	NI-CES-2024C-AC/-DC, NI-CES-2024F-AC/-DC, NI-CES-2048C-AC/-DC, NI-CES-2048F-AC/-DC, NI-CES-2048CX-AC/-DC, NI-CES-2048FX-AC/-DC	NI-CER-2024C-AC, NI-CER-2024C-ADVPREM-AC NI-CER-2024C-DC, NI-CER-2024C-ADVPREM-DC NI-CER-2024F-AC, NI-CER-2024F-ADVPREM-AC NI-CER-2024F-DC, NI-CER-2024F-ADVPREM-DC NI-CER-2048C-AC, NI-CER-2048C-ADVPREM-AC NI-CER-2048C-DC, NI-CER-2048C-ADVPREM-DC NI-CER-2048F-AC, NI-CER-2048F-ADVPREM-AC NI-CER-2048F-DC, NI-CER-2048F-ADVPREM-DC NI-CER-2048CX-AC, NI-CER-2048CX-ADVPREM-AC NI-CER-2048CX-DC, NI-CER-2048CX-ADVPREM-DC NI-CER-2048FX-AC, NI-CER-2048FX-ADVPREM-AC NI-CER-2024-2X10G, NI-CER-2024-ADVU NI-CER-2048-ADVU	NI-MLX-4-AC/-DC, NI-MLX-8-AC/-DC, NI-MLX-16-AC/-DC, NI-MLX-32-AC/-DC	SI-1008-1, SI-1008F-1, SI-1016-2, SI-1016F-2, SI-1016-4, SI-1016F-4, SI-1216-4, SI-1216F-4, SI-4000, SI-10000	NI-MLXE-4-AC/-DC, NI-MLXE-8-AC/-DC, NI-MLXE-16-AC/-DC, NI-MLXE-32-AC/-DC	NI-XMR-4-AC/-DC, NI-XMR-8-AC/-DC, NI-XMR-16-AC/-DC, NI-XMR-32-AC/-DC
INTERFACE SLOTS	N/A	1 (uplink)	1 10 GbE uplink slot	4, 8, 16, 32	2, N.A., N.A.	4, 8, 16, 32	4, 8, 16, 32
MAXIMUM PORTS	<ul style="list-style-type: none"> 12 10/100/1000 Base-T ports 12 100/1000 Base-X ports 100/1000 Base-X SFP ports 	<ul style="list-style-type: none"> Up to 48 x 10/100/1000 MbE (RJ45) Up to 48 x 100/1000 MbE (SFP) 4 x combination (SFP or RJ45) Up to 2 x 10 GbE (XFP) 	<ul style="list-style-type: none"> Up to 48 x 10/100/1000 MbE (RJ45) Up to 48 x 100/1000 MbE (SFP) 4 x combination (SFP or RJ45) Up to 2 x 10 GbE (XFP) 	<ul style="list-style-type: none"> Up to 1,536 x 10/100/1000 MbE (RJ45/RJ21) Up to 768 x 100/1000 MbE (SFP) Up to 16 x 100 GbE (CFP) Up to 256 x 10 GbE (XFP/SFP+) Up to 256 x OC12/48 POS/SDH Up to 64 x OC192 POS/SDH 	Modular Platform (4000 and 10000): <ul style="list-style-type: none"> Up to 48 x 10/100/1000 Mbps (RJ45) Up to 48 x 1 Gbps fiber (SFP) Up to 16 x 10 Gbps (XFP) Up to 256 x 10 GbE (XFP/SFP+) Fixed Platform (1000): <ul style="list-style-type: none"> Up to 16 x 10/100/1000 Mbps (RJ45) Up to 16 x 1 Gbps fiber (SFP) Up to 2 x 10 Gbps fiber (SFP+) 	<ul style="list-style-type: none"> Up to 1,536 x 10/100/1000 MbE (RJ45/RJ21) Up to 768 x 100/1000 MbE (SFP) Up to 256 x 10 GbE (XFP) Up to 256 x OC12/48 POS/SDH Up to 64 x OC192 POS/SDH 	<ul style="list-style-type: none"> Up to 768 x 10/100/1000 MbE (RJ45) Up to 768 x 100/1000 MbE (SFP) Up to 16 x 100 GbE (CFP) Up to 256 x OC12/48 POS/SDH Up to 64 x OC192 POS/SDH
HARDWARE FEATURES	<ul style="list-style-type: none"> Up to 24 Gbps forwarding capacity 8 Mb of packet buffering 1+1 Redundant AC/DC power supplies Fanless design 	<ul style="list-style-type: none"> Up to 136 Gbps switching capacity Up to 101 MPPS forwarding capacity Low latency Deep packet buffering 1+1 redundant AC/DC power supplies Hot swappable power supplies Hot swappable fan unit Front-to-back airflow 	<ul style="list-style-type: none"> Up to 136 Gbps switching capacity Up to 101 MPPS forwarding capacity Up to 512K Ipv4 FIB entries Low latency Deep packet buffering 1+1 redundant AC/DC power supplies Hot swappable power supplies Hot swappable fan unit Front-to-back airflow 	<ul style="list-style-type: none"> Up to 7.68 Tbps switching capacity Up to 4 BPPS forwarding capacity Front-to-Back airflow Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units 	<ul style="list-style-type: none"> Up to 3 million L4 HTTP connections/sec Up to 70 Gbps L4 & L7 switching capacity Up to 18 million DNS queries/sec Up to 320 Gbps raw switching Up to 120 million SYN protection/sec N+N redundant power supplies Hot swappable fan unit 	<ul style="list-style-type: none"> Up to 15.36 Tbps switching capacity Up to 4.8 billion PPS forwarding capacity Rear exhaust on all models Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units 	<ul style="list-style-type: none"> Up to 7.68 Tbps switching capacity Up to 4 BPPS forwarding capacity Front-to-Back airflow Redundant management modules Redundant fabric modules M+N redundant power supplies Hot swappable modules Hot swappable power supplies Hot swappable fan units
MODULES AVAILABLE (INDIVIDUAL)	N/A	N/A	N/A			N/A	
MODULES AVAILABLE (SHARED)	N/A	<ul style="list-style-type: none"> 2-port 10 GbE uplink module 	<ul style="list-style-type: none"> 2-port 10 GbE uplink module 	<ul style="list-style-type: none"> Management module Switch fabric module and High-speed switch fabric module 1-port 100 GbE module 8-port 10-GbE SFP+ module (-D, -M, -X versions) 4-port 10-GbE XFP module 2-port 10-GbE XFP module 48-port 10/100/1000Base-T, MRJ21 module 24-port 1-GbE (ML) Copper (RJ-45) Module 24-port 1-GbE (ML) Fiber (SFP) Module 8-port OC-12/48 POS/SDH module 4-port OC-12/48 POS/SDH module 2-port OC-12/48 POS/SDH module 2-port OC192 POS/SDH module 	<ul style="list-style-type: none"> Management module Application switch module Switch fabric module 12-port 10/100/100 MbE RJ45 module 12-port 1 GbE SFP module 4-port 10 GbE XFP module 	<ul style="list-style-type: none"> Management module High-speed switch fabric module 2-port 100 GbE module 8-port 10-GbE SFP+ module (-D, -M, -X versions) 4-port 10-GbE XFP module 2-port 10-GbE XFP module 48-port 10/100/1000Base-T, MRJ21 module 24-port 1-GbE (X) Copper (RJ-45) Module 24-port 1-GbE (X) Fiber (SFP) Module 20-port 1-GbE (X) Copper (RJ-45) Module 8-port OC-12/48 POS/SDH module 4-port OC-12/48 POS/SDH module 2-port OC-12/48 POS/SDH module 2-port OC192 POS/SDH module 	<ul style="list-style-type: none"> Management module Switch fabric module and High-speed switch fabric module 1-port 100 GbE module 8-port 10-GbE SFP+ module (-D, -M, -X versions) 4-port 10-GbE XFP module 48-port 10/100/1000Base-T, MRJ21 module 24-port 1-GbE (X) Copper (RJ-45) Module 24-port 1-GbE (X) Fiber (SFP) Module 20-port 1-GbE (X) Copper (RJ-45) Module 8-port OC-12/48 POS/SDH module 4-port OC-12/48 POS/SDH module 2-port OC-12/48 POS/SDH module 2-port OC192 POS/SDH module
HEIGHT	1 RU	1 RU	1 RU	4, 7, 14, 33 RU	1, 4, 10 Ru	5, 7, 14, 33 RU	4, 7, 14, 33 RU
MANAGEMENT MODULES (+REDUNDANCY)	N/A	N/A	N/A	1 (Base) + 1 (Optional)	N.A./1/1 (Base) + N.A./0/1 (Optional, non-redundant)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)
SWITCH FABRIC MODULES (+REDUNDANCY)	N/A	N/A	N/A	2/3/7 (Base) + 1/1/1 (Optional)	N.A./1/2 (Base)	2/2/3/7 (Base) + 1/1/1/1 (Optional)	2/3/7 (Base) + 1/1/1 (Optional)
AC POWER SUPPLIES (+REDUNDANCY)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)	1 (Base) + 1 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)	1/1/2 (Base) + 1/1/2 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)	1/2/4/4 (Base) + 2/2/4/4 (Optional)
HOT SWAPPABLE COMPONENTS	N/A	SFP/XFP transceivers, power supplies, fan assembly	SFP/XFP transceivers, power supplies, fan assembly	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, interface modules	SFP/XFP transceivers, power supplies, fan assemblies, interface modules (involve 'disable' command)	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, and interface modules	SFP/XFP transceivers, power supplies, fan assemblies, switch fabric modules, management modules, interface modules
HARDWARE OPTIONS (INDIVIDUAL)	N/A	Mid-mount rack kit 8-slot	Mid-mount rack kit 8-slot			N/A	
HARDWARE OPTIONS (SHARED)	N/A	<ul style="list-style-type: none"> 500W AC/DC power supply Rack mount kit (Extra long ears) 	<ul style="list-style-type: none"> 500W AC/DC power supply Rack mount kit (Extra long ears) 	<ul style="list-style-type: none"> 1200W AC/DC power supply 2400W AC/DC power supply 	<ul style="list-style-type: none"> 1200W AC/DC power supply 	<ul style="list-style-type: none"> 1200W AC/DC power supply 2400W AC/DC power supply 	<ul style="list-style-type: none"> 1200W AC/DC power supply 2400W AC/DC power supply
STANDARD SOFTWARE	<ul style="list-style-type: none"> Full Layer 2 features including Ethernet Ring Protection, Spanning Tree Protocols, Virtual LAN (VLAN) tag translation, Provider Bridging, and IGMP snooping Layer 3 static routing for Internet connectivity 	<ul style="list-style-type: none"> Advanced Layer 2 and Base Layer 3 including edge security, 802.1x, QoS and comprehensive hardware based port and VLAN based ACL policies 	<ul style="list-style-type: none"> Advanced Layer 2 and 3 functions: Full Layer 3, including RIP, OSPF, IS-IS, and BGP Virtual routing in non-MPLS environments via Multi-VRF All classic Layer 2 capabilities QoS and ACLs Management via SNMP/CLI 	<ul style="list-style-type: none"> Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RIPvng, VRRP, VRRPE, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF 	<ul style="list-style-type: none"> Layer 2, L3 routing (RIPv1/v2, Static), Layer 4-7 Application delivery (SLB), Graphical User Interface (GUI) Management, XML API extensions, and hot-standby HA 	<ul style="list-style-type: none"> Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RIPvng, VRRP, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF 	<ul style="list-style-type: none"> Full Layer 3 MPLS +IPv4+IPv6 routing including BGP, OSPFv2/v3, ISIS, RIP, RIPvng, VRRP, PIM-SM/SSM/DM, MPLS, LDP, RSVP, VPLS, VLL, MPLS L3VPNs and multi-VRF
OPTIONAL SOFTWARE UPGRADES	N/A	<ul style="list-style-type: none"> Full Layer 3 IPv4 upgrade including BGP-4, RIPv1/v2, OSPFv2, DVMRP, PIM Full Metro upgrade including MPLS, VPLS, VLL, PBB 	<ul style="list-style-type: none"> All functions in BASE plus: Multi-Protocol Label Switching (MPLS) Layer 2 VPNs using VPLS and VLLs Provider Bridges (IEEE 802.1ad) Provider Backbone Bridges (IEEE 802.1ah) Connectivity Fault Management (IEEE 802.1ag) and Service OAM Ethernet Service Instance (ESI) framework 	<ul style="list-style-type: none"> Layer 3 routing including RIPv1/v2, OSPFv2 & v3, IS-IS, Static, and BGP, Global Server Load Balancing (GSLB) IPv6 NAT64, IPv6 SLB, OpenScript™, symmetric active-standby HA, symmetric active-active HA, Multi-Port Binding, Server Group Pools SSL Offload and Acceleration, SYN and DDoS Protection 	N/A	N/A	N/A
OTHER BASE FEATURES	N/A	N/A	N/A	N/A	Application Resource Broker (ARB) for Integrated management in heterogeneous virtualization environment	N/A	N/A
TARGET ENVIRONMENT	<ul style="list-style-type: none"> Cell site switch for 4G backhaul and public safety networks Managed CPE device for Business/Enterprise services Access switch for Fiber-To-The-Home (FTTH) Layer 2 access switch for residential triple-play services 	<ul style="list-style-type: none"> Service Provider/Metro access FTT applications 	<ul style="list-style-type: none"> Service Provider Metro access/ aggregation Enterprise WAN gateway Service Provider managed router BGP router reflector 	<ul style="list-style-type: none"> Service Provider/Metro aggregation Internet Exchange Provider (IXG) Multiservice Provider Edge (PE) 	<ul style="list-style-type: none"> SP (Cloud, Carrier, Mobile, Content Provider) data center Enterprise Data Center High-performance, low-latency Application Delivery IPv6 Transition SSL offload Infrastructure applications - DNS/E-Mail/AAA/Firewall/Cache 	<ul style="list-style-type: none"> Transit Internet Exchange Provider (IXP) Cable MSO Content Delivery Network (CDN) Federal High-performance computing Research networks 	<ul style="list-style-type: none"> Internet Service Provider (ISP) Service Provider core Multiservice Provider Core (P)